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Lee, Won and Ellison, Mark (2018) Police Risk Assessment of Domestic Abuse: The mediating role of space and time. In: European Society of Criminology, 29 August 2018 - 01 September 2018, Sarajevo, Bosnia & Herzegovina. (Unpublished)

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# ***Police Risk Assessment of Domestic Abuse : The mediating role of space and time***

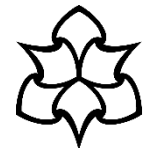
Manchester Metropolitan University Crime & Well-Being Big Data Centre  
Won Do Lee & Mark Ellison

**EuroCrim2018: August 30<sup>th</sup> 2018**

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Manchester Metropolitan University  
Crime & Well-Being Big Data Centre

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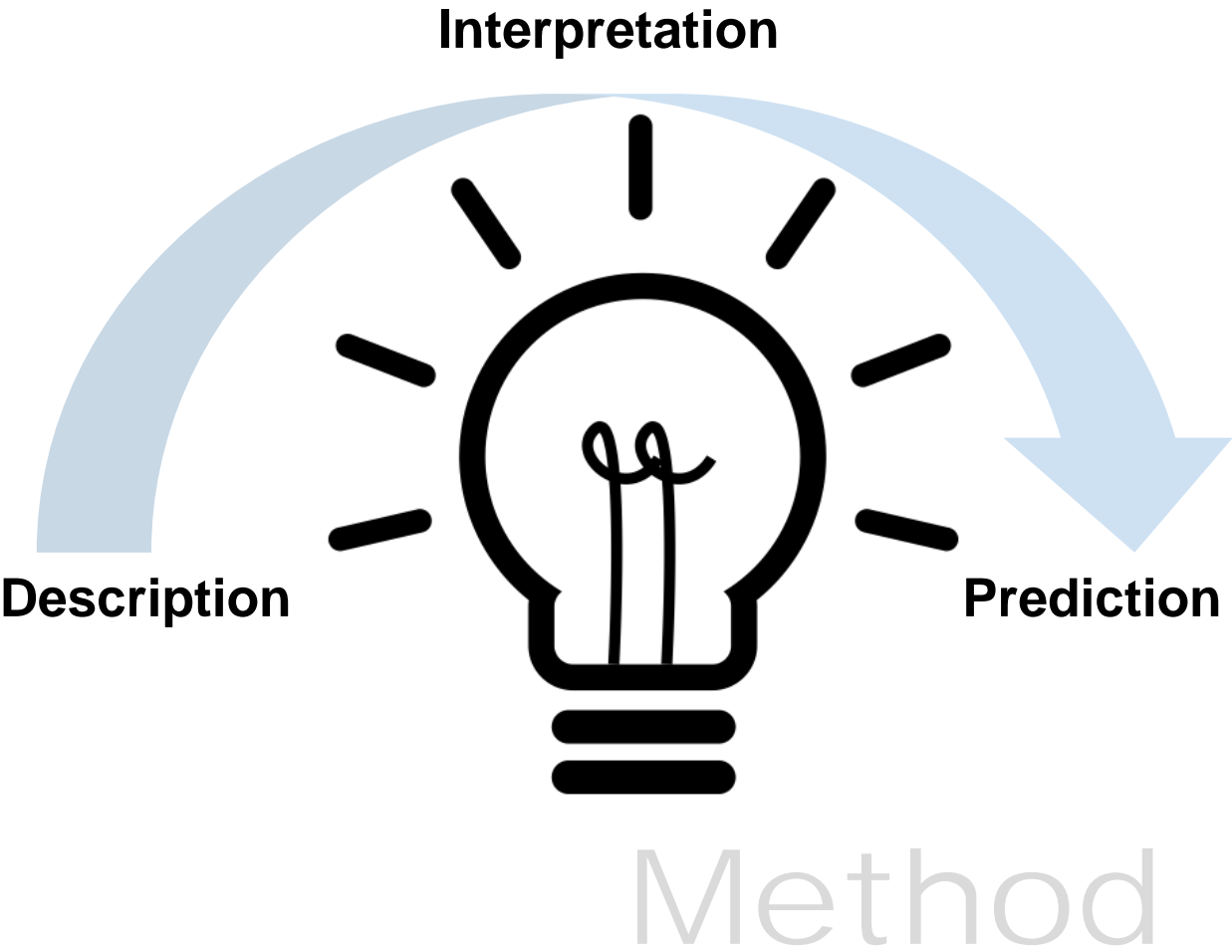
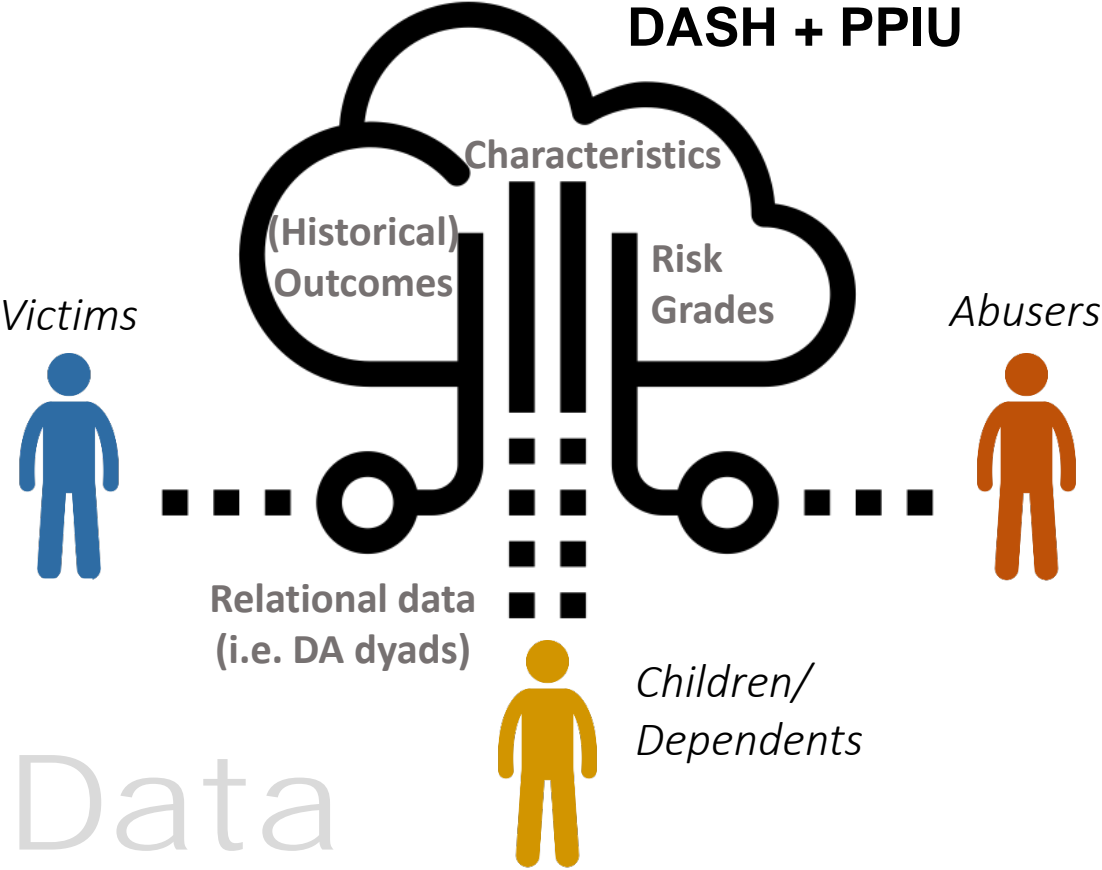
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# Background

- UK government's definition of DA
  - "Any incident or pattern of incidents of controlling, coercive, threatening behaviour, violence or abuse between those aged 16 or over who are, or have been, intimate partners or family members regardless of gender or sexuality. The abuse can encompass, but is not limited to psychological, physical, sexual, financial, emotional."
- Understanding demand to support effectiveness, efficiency and equality / legitimacy
  - Domestic Abuse growth: 160% increase in DA crimes between 2014 to 2018.



# Factors shaping the assessment of DA



*Data Science approach in DA study*

# DASH model

- The Domestic Abuse, Stalking and Honour-based Violence (DASH) risk identification model:
  - 27 questions about the incident, historical abuse records, children / dependants and the abuser.
  - Employed to evaluate the risk scores (i.e. Standard, Medium, and High risk).
- DASH has a number of purposes (Medina Airza et al., 2016): Prediction of risk, Harm estimation, and, and Demand management.
- Existing researches on DASH
  - ... indicated on the qualitative assessment of key factors (Hoyle 2007, Robinson 2010, Bland and Ariel 2015).
  - ... employed/conducted the discriminant analysis for the risk scores at a global level (Robinson et al. 2012; 2016; 2018).

# Research Questions

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- 1) Do DASH assessments lead to a consistent risk classification?
  - Does perceived information, which victims responds to DASH, leading a consistent risk classification?
- 2) Do initial DA risk classification vary spatially and temporally?
  - Variance in practice: Locations are different (*where*) and Variance over time (*when*)
  - Neighbourhood characteristics

# Data

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- Utilising six years of data (for the period of 2011-2016)
- Datasets rebuilt into a relational database;
  - Public Protection Incidents (PPI) including DASH assessment and risk classification outcomes (380,000 cases)
  - Incidents / Calls for Service
  - Dataset victim and episode focused.
  - Inclusion / exclusion of missing values / refuse to answer – different models (M1 / M2)



# Method

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- RQ1: Application of ML classification algorithms, to evaluate the reliance on DASH in risk assessment
  - Bootstrapping approach: 11 Machine Learning Algorithms were deployed to assess the reliance on DASH
  - Prediction accuracy measured by confusion matrix to describe the performance of a classification model (i.e. initial risk grades and overall) by train / test datasets
  - Employing both Probabilistic (Logistic / naïve Bayes) and Heuristic (J48 / LMT) approaches
- RQ2: Descriptive statistics, to detect the variations between space and time (resources)



# Conclusion and discussion

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## 1) Inconsistent application of DASH in risk assessment

- Lower reliance on DASH for Medium and High risk incidents.

## 2) Variance in risk classification by spatially and temporally

- Varies by location suggests the inconsistent practices across local authorities.
- Varies by time suggests the time-sensitivity of resources impacts upon the risk assessment process.

### • Next step

- Exploring the impact of associative attributes (e.g. personal characteristics and historical outcomes) on the risk assessment process.
- Understanding the nature of DA dyads (i.e. bi-directional relationship / pairing between DA entities).
- Investigating the importance of outcomes with respect to the sequence of DA episodes (cooperate with GMP).



**Dr. Won Do Lee (W.Lee@mmu.ac.uk) | Research Associate**  
**Mark Elision (M.Ellison@mmu.ac.uk) | Data Centre Manager**

Manchester Metropolitan University Crime and Wellbeing Big Data Centre  
Website: [www.mmu.ac.uk/bdc](http://www.mmu.ac.uk/bdc)